


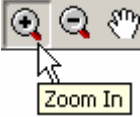



## Getting Started with ArcExplorer—Java Edition for Education – Lesson 1

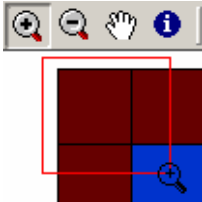
This lesson covers the following ideas, tools, and capacities:


- Opening stored projects
- Turning layers on and off
- Changing the sequence of layers
- Zooming and panning
- Active layer
- Identifying
- Features
- Attributes
- Tables
- Sorting
- Selection
- Selecting by attribute
- Selecting by find
- Selecting by legend symbol
- Selecting by geography
- Selecting by query

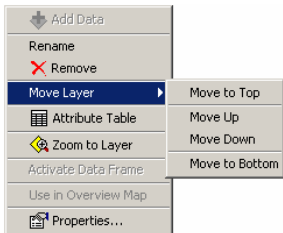
1.  Start AEJEE. (You may need to check with your teacher or tech coordinator to find out where AEJEE was installed and where the "startup" file is located.)
2.  Begin by opening a project that has been already created for you. Click the "Open..." button or choose the menu item **FILE/OPEN**.
3. Use the window to navigate to where AEJEE data and projects are stored. By default, this is in [harddrive]/ESRI/AEJEE/DATA. (You may need to check with your teacher or tech coordinator to verify the location.)
4. Find the file "10grid\_hd.axl". Click the file name and click "Open".
5. Look at the AEJEE window for a minute. Compare what you see with the graphics from the "Intro to AEJEE" document. The column at left is called the "Table of Contents" (or "TOC"), and the map space is called the "View". Right now, the View shows a grey box, and the TOC shows two layers, called "**studyarea**" and "**polygons**".
6.  In the TOC, notice that the "**studyarea**" layer is turned on, indicated by a black check mark. Notice that the "**polygons**" layer is turned off. Click the check box for the "**polygons**" layer to turn it on, and notice that it displays in the View. Turn off the "**studyarea**" layer, then turn it on again, and notice that the map doesn't really change. The map builds from the bottom to the top of the TOC. Whichever layers are on top and turned on in the TOC will be on top and turned on in the View. Keep the "**polygons**" layer turned on.

7.  Let's see how to move around the map. Look for the "**Zoom In**" tool and click it. Click once anywhere in the View. The map will zoom in a little bit, centered on where you clicked. You can do it again, and again, and again, zooming in a little bit each time.

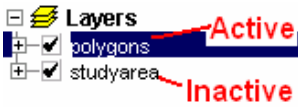
8.  "Oops! I messed up! I want to see everything!" Easy to do. Look for the "**Zoom to Full Extent**" button and click it. No matter where you might be, clicking the "**Zoom to Full Extent**" button zooms the View back to fit everything that is included in the TOC.


9.  Now use the "**Zoom In**" tool with a "click-hold-drag diagonally" process, creating a red box around the area into which you want to zoom. Let go, and you'll zoom into the space you just outlined.

10.  Move your mouse along the "Zoom-Pan Toolbar" to see what the other tools do, and try them out. You'll use these tools constantly. When finished, click the "**Zoom to Full Extent**" button.

11.  In the TOC, right-click the name "**polygons**" to see a context menu for the layer. Slide the mouse to "**Move Layer**", then to "**Move to Bottom**", and left-click. The "**polygons**" layer will go to the bottom of the set of layers in the TOC, and the map will re-draw. Try it again, this time choosing to move the "**polygons**" layer up. The "**polygons**" layer will move up one level in the TOC, which in this case means it will jump back up to the top of the list.

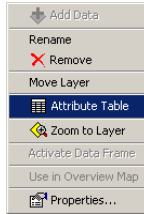
**Macintosh users note:** on a single button mouse, you can use the "CTRL" key plus the mouse to perform "right-click" activities.

12.  Now it's time to engage a process on a specific layer. First, you need to focus the computer on the desired layer. Click once directly on the name "**polygons**" in the TOC to highlight the layer. This process is also called "**making it active**."

13.  Each of the features in the "**polygons**" layer has a set of information attached to it. You can see this by choosing the "**Identify**" tool and clicking, one by one, on different features in the "**polygons**" layer. (How many pieces of information does each feature have?) Make the "**studyarea**" layer active and try again. Close the "**Identify Results**" window.

**NOTE:** The power of any map is that it is a simplified version of the real world. The power of GIS begins with the process of matching geographic features (represented by points, lines, areas, and images) with characteristics about each feature.

14.



You can see the entire set of information about all features in the "**polygons**" layer by making it active, then right-clicking the name "**polygons**" to open the context menu, and scrolling down to choose "**Attribute Table**". In the window "**Attributes of polygons**", notice that you can scroll left and right, and up and down, to see all the information about the features. (How many pieces of information does each feature have? Which columns were not shown when using the "**Identify**" tool?)

**NOTE:** In the GIS world, characteristics of features are called "attributes". In a table, all the features of that data set will have a similar set of attributes; tables make it easy to organize and explore the information. It's OK if some pieces of information about the features don't make sense right away, but it is helpful to see if you can figure out what they mean.

15.



Our study area covers a grid that is 10 squares by 10 squares, or 100 total squares. How many of each type of landform are there? We could count on the map, square by square, or count in the table, looking row by row for all the ones of a certain type, but that's what a computer is particularly good at. In the "**Attributes of polygons**" window, right-click the column header "**Landform**" and choose "**Sort Ascending**". The table shuffles into alphabetical order based on Landform. Click the top row, then hold down the keyboard's "SHIFT" key and click the last row identified as "**Hill**", turning all those rows bright blue. At the bottom of the window, how many does it say have been "**selected**"?

16.



Having selected some records in the table, look what happens in the map. The "Hill" squares now have a yellow hatch pattern on top, indicating they are "selected." They were selected in the table, but are also selected in the map. Let's see if it works the other way, first by clearing the selection. Close the table and click the "**Clear All Selection**" button.

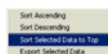
**NOTE:** In GIS, the map and its tables are tied together. Select features in a table and they will be selected in the map; select them in the map and they will be selected in the associated table.

17.



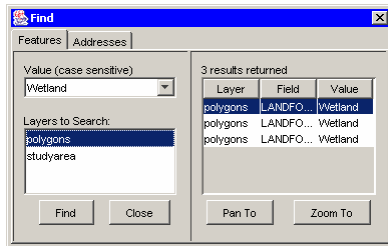
Look in the View and notice that there are only three green squares (wetland). In the TOC, click on the green box symbol for "Wetland". Notice that they have become selected on the map, covered with the yellow hatch pattern. Now, open the table for "**polygons**".

18.



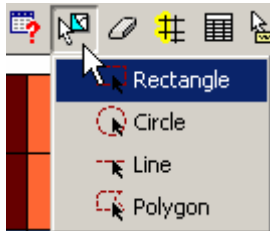
Right-click any one of the field names and choose "**Sort Selected Data to Top**". See which rows are colored blue, and how many there are. Close the Attribute table and click the "**Clear All Selection**" button.

19.



You can also select features one by one using the "**Find**" tool. In the View, click the "**Find**" tool (binoculars), highlight the "polygons" layer, and type "Wetland" (no quote marks, but with a capital 'W') in the left box. Click the "Find" button at the bottom. Three entries appear on the right. Move the "Find" box to the side and click, one by one, on the three listed choices. Close "**Find**".

20.



You can also select in the map using your mouse. Click the "**Select Features**" tool and choose "**Rectangle**". Drag a box in the map and see how many polygons you select. You can try it again, dragging a different sized box. Notice that when you select any part of a feature, that entire feature is selected. Try this with the **Circle** tool, and notice that it selects whole squares, not just the circled area. Same with the **Line** tool. When you use the **Polygon** tool and "click-click-click-doubleclick" to draw an irregularly shaped area, you select whole features again. Each time, looking at the Attributes table will show you how many features were selected. When you're finished, close the table and click the "**Clear All Selection**" button.

21.

The final step in learning about selections is to explore the "**Query Builder**". Queries let you ask questions, using the power of the computer to highlight answers in the map. Suppose you wanted to find the mountainous areas with elevation greater than 80. You could use the "**Identify**" tool and look at the elevation of each mountainous region. Or you could open the attribute table for "**polygons**" and select by landform, then sort by elevation. Building a query uses the power of the computer to do the work for you.

22.

In the TOC, click once on the name "**polygons**" to highlight that name, telling the computer the layer about which you want to ask a question.

**NOTE:** Be sure to highlight (or "**make active**") the layer on which you want the computer to focus. Confusion in building queries often starts when the computer's attention is not focused on the desired layer.

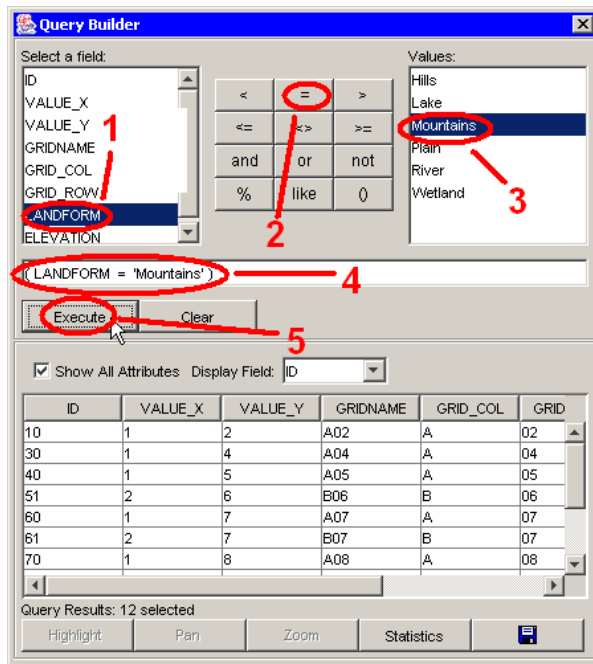
23.



Click the "**Query Builder**" button and look at the resulting window.

**Macintosh users note:** Sometimes, in windows such as the Query Builder, a single click only focuses the computer on the portion of the window in which you wish to operate. In windows such as these, it is important to see if each click is accomplishing what you wish. A good rule of thumb is "Click once, first; if that doesn't do the job, click a second time; if that still doesn't do the job, double-click."

24.



To build the first part of your query, go through the five steps shown here:

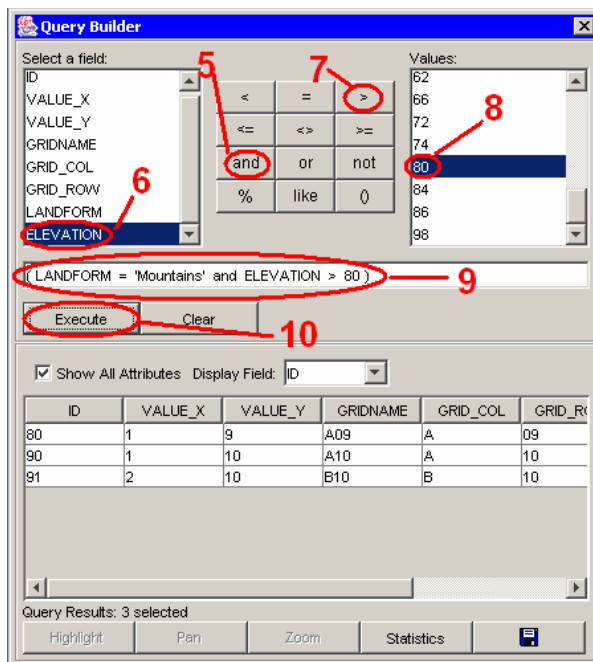
1. In the "Select a field" window, click "Landform". Notice that it begins building a statement in the empty box below.
2. In the "operations" zone, click "=".
3. In the "Values" window, click "Mountains".
4. Verify what you are asking the computer to do, saying aloud the phrase "Please computer select for me all those features in the highlighted layer for which..." and add the sentence you have built...(LANDFORM = 'Mountains')
5. If the sentence makes sense to you, click the "Execute" button.

If the results don't look like the bottom part of the window shown here, click the "Clear" button and try steps 1-5 again.

25.

OK! You're partway done. You can see that there are 12 features in the "polygons" layer that are mountainous, but we really wanted to find out the mountains areas over elevation 80. We need to modify our query.

26.

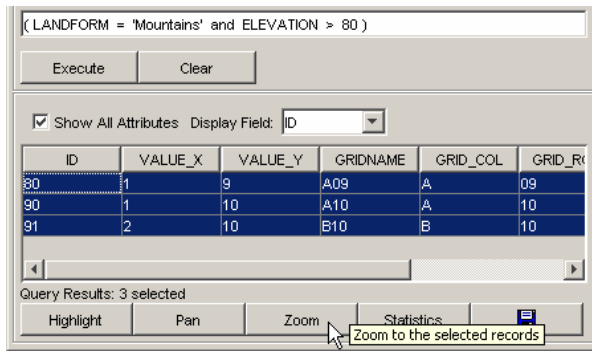


Click the "Clear" button to erase any previous query and results, then use the same steps 1-4 as above. Complete the query by adding steps 5-10 here:

5. After completing the first phrase, click the "and" button.
6. In the "Select a Field" window, click "Elevation".
7. In the "operations" zone, click ">".
8. In "Values", click "80".
9. Verify again by saying aloud the phrase "Please computer select for me all those features in the highlighted layer for which..." and add the sentence you have built...(LANDFORM = 'Mountains' and ELEVATION > 80)
10. Click the "Execute" button.

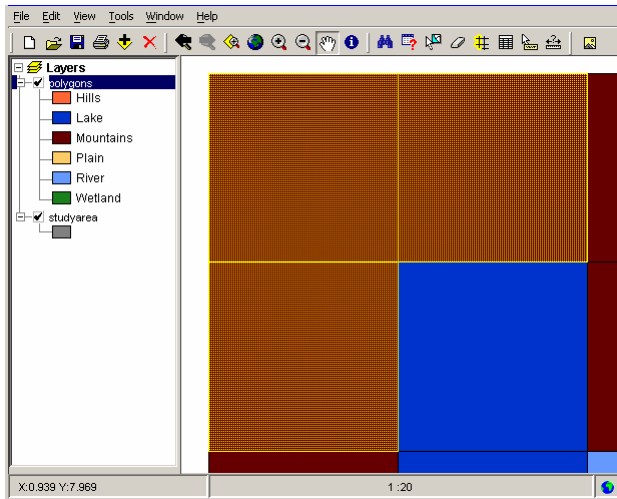
If the results don't look right, click the "Clear" button and try it again.

27.



After isolating the three features that meet both criteria, select the three records by dragging the mouse across them in the results table. Once selected, click the "Zoom" button in order to zoom to the selected records on the map.

28.



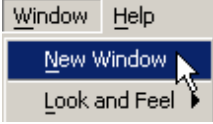
You should see that only three squares are mountainous regions with elevation over 80. There are definitely other mountainous squares, but only these squares match both criteria.

**NOTE:** Creating these "compound queries" and seeing the resulting map is a great way for GIS users to tap into large data files to explore relationships and discover patterns. With AEJEE, you can build creative queries, comparing attributes or even using math operations within the queries.

29.

**REVIEW:** In this lesson, we have covered the following ideas, tools, and capacities:

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30.  **SELF CHECK:** Now it's time to see if you can use these concepts and skills in a new project. First, create a new AEJEE window by choosing the menu item "**Window/New Window**". (You can move this second window around on the screen as you need to.)

31. Navigate to and open the project "**us\_hd.axl**".
32. How many states had less than 1 million acres of cropland in 1997? \_\_ What is the name of the northernmost state with less than one million ("**<1m**") acres of cropland in 1997? \_\_
33. Zoom in to northern Texas. Turn on the counties layer. Five counties make up the northernmost "row" in Texas. Of the five northernmost counties in Texas, which one had the most acres of cropland in 1997? \_\_ (Hint: Look for "**CROP\_ACR97**")
34. "**POP00\_SQMI**" means "population per square mile in 2000". In all of the U.S., only four counties had over 20,000. Name the four counties \_\_, and describe two different ways to find the answer. \_\_

**FOR THE TEACHER:**

- 32-A Twelve states had less than one million acres. The best way to see this is to click the grey symbol under "**states: CropAcres97**" in the TOC, then open the attributes table. Right-click one of the table field names (such as "**STATE\_NAME**") and choose "**Sort Selected Data to Top**". Notice that Alaska and Hawaii are both listed in the table, even though they are not shown in the map as it opens up. Therefore, the northernmost state meeting the criterion is not Maine, as appears on the map when it opens, but Alaska, as noted when you click the "**Zoom to Full Extent**" button.
- 33-A When you zoom in to northern Texas and turn on the counties layer, you'll see there are three colors in a row. Five counties make up those three colors. Make active the counties layer. One by one, click on a county in northernmost Texas, scroll to the bottom of the Identify Results window, and look for the field "**CROP\_ACR97**". You do not need to close the Identify Results window each time, but can click your way from county to county until you discover that Sherman County had 354991 acres of cropland in 1997.
- 34-A This can be answered either with a query (**POP00\_SQMI > 20000**) or by opening the Attribute table and sorting the field **POP00\_SQMI** in descending fashion. Either way, you should find that only four counties (New York, Kings, Bronx, and Queens) exceeded 20,000 people per square mile in 2000.